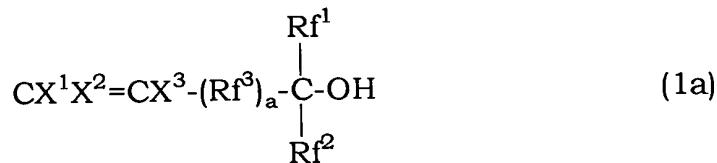


WHAT IS CLAIMED IS:

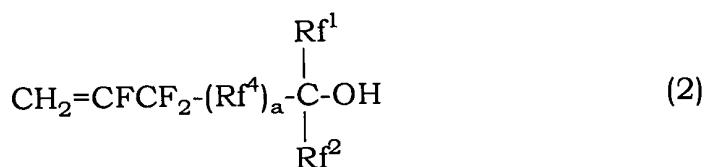
1. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (1a):

5



10 wherein X^1 and X^2 are the same or different and each is H or F; X^3 is H, F, Cl or CF_3 (at least one of X^1 , X^2 and X^3 is H and X^1 , X^2 and X^3 are not H at the same time); Rf^1 and Rf^2 are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^3 is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 15 0 or 1.

20 2. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (2):



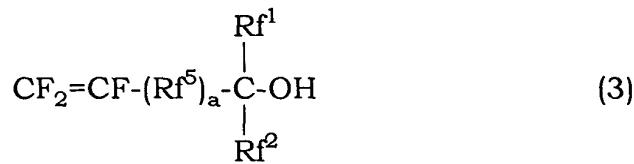
25

wherein Rf^1 and Rf^2 are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^4 is a fluorine-containing alkylene

group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1.

- 5 3. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (3):

10

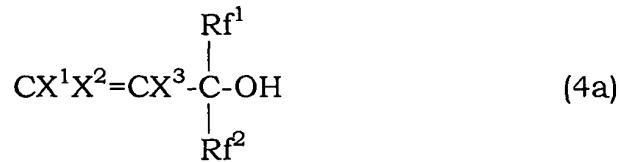


wherein Rf¹ and Rf² are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf⁵ is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene

15 group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 0 or 1.

- 20 4. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (4a):

20

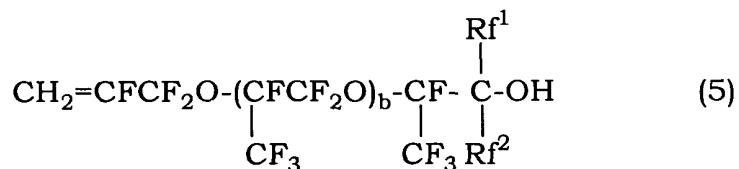


25 wherein X¹ and X² are the same or different and each is H or F; X³ is H, F, Cl or CF₃ (at least one of X¹, X² and X³ is H and X¹, X² and X³ are not H at the same time); Rf¹ and Rf² are the same or different and each is a

perfluoroalkyl group having 1 to 20 carbon atoms.

5. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (5):

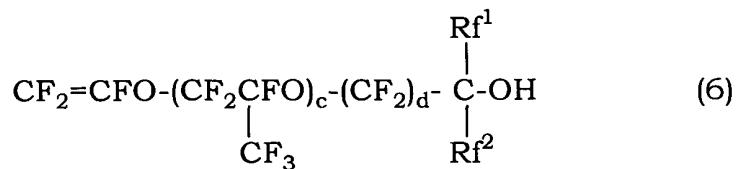
5



10 wherein Rf¹ and Rf² are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; b is an integer of from 1 to 13.

6. A fluorine-containing ethylenic monomer having hydroxyl represented by the formula (6):

15



20 wherein Rf¹ and Rf² are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; c is an integer of from 1 to 13; d is an integer of from 1 to 5.

25 7. A fluorine-containing polymer having a number average molecular weight of from 500 to 1,000,000 represented by the formula (7a):

- (M) - (A) - (7a)

wherein the structural unit M is a structural unit derived from the fluorine-containing ethylenic monomer having hydroxyl of Claim 1
5 which is represented by the formula (1a), the structural unit A is a structural unit derived from monomer copolymerizable with the structural unit M,
and the structural unit M and the structural unit A are contained in amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole,
10 respectively.

8. A fluorine-containing polymer having a number average molecular weight of from 500 to 1,000,000 represented by the formula (7b):

15

- (M) - (A) - (7b)

wherein the structural unit M is a structural unit derived from the fluorine-containing ethylenic monomer having hydroxyl of Claim 3
20 which is represented by the formula (3), the structural unit A is a structural unit derived from monomer copolymerizable with the structural unit M,
and the structural unit M and the structural unit A are contained in amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole,
25 respectively.

9. A fluorine-containing polymer having a number average

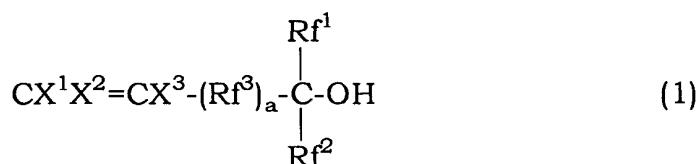
molecular weight of from 500 to 1,000,000 represented by the formula (7):

- (M) - (A) - (7)

5

wherein the structural unit M is a structural unit derived from a fluorine-containing ethylenic monomer having hydroxyl represented by the formula (1):

10



15

wherein X^1 and X^2 are the same or different and each is H or F; X^3 is H, F , Cl or CF_3 ; Rf^1 and Rf^2 are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^3 is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is 20 0 or 1, the structural unit A is a structural unit derived from a fluorine-containing ethylenic monomer copolymerizable with the structural unit M except the monomer of the formula (1a), and the structural unit M and the structural unit A are contained in amounts of from 0.1 to 100 % by mole and from 0 to 99.9 % by mole, 25 respectively.

10. The fluorine-containing polymer of Claim 9, wherein the

structural unit A is at least one selected from fluorine-containing ethylenic monomers represented by the formula (8):

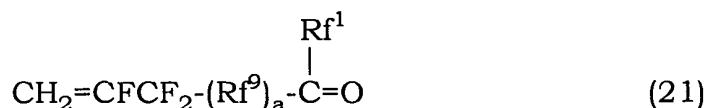


5

wherein X^4 and X^5 are the same or different and each is H or F; X^6 is H, F or CF_3 ; X^7 is H, F, Cl or CF_3 ; at least one of X^4 , X^5 , X^6 and X^7 is F or CF_3 .

10

11. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (21):



15

wherein Rf^1 is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^9 is a fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms; a is 0 or 1.

20

12. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (23):

25

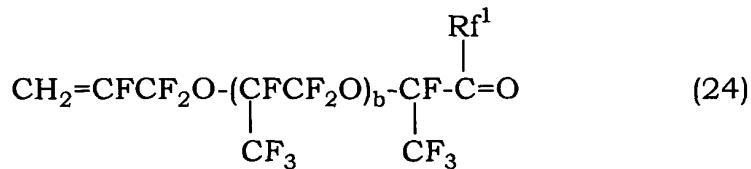


wherein X^1 and X^2 are the same or different and each is H or F; X^3 is H,

F, Cl or CF₃; Rf¹ is a perfluoroalkyl group having 1 to 20 carbon atoms.

13. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (24):

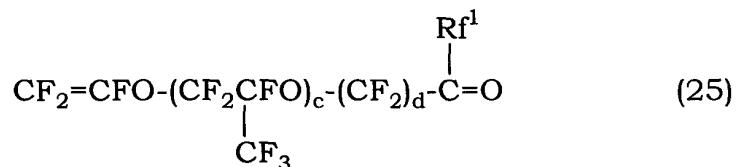
5



10 wherein Rf¹ is a perfluoroalkyl group having 1 to 20 carbon atoms; b is an integer of from 1 to 13.

14. A fluorine-containing ethylenic monomer having fluoroalkyl carbonyl group represented by the formula (25):

15



20 wherein Rf¹ is a perfluoroalkyl group having 1 to 20 carbon atoms; c is an integer of from 1 to 13; d is an integer of from 1 to 5.

15. A photoresist composition which is a composition comprising:

25 (A) a fluorine-containing polymer having, as an essential component, a structural unit obtained by polymerizing a fluorine-containing ethylenic monomer having OH group,

(B) a photoacid generator, and

(C) a solvent,

in which, when the carbon atom bonded to OH group of the fluorine-

containing ethylenic monomer having OH group is named the first

5 carbon atom, and a structure consisting of the first carbon atom up to
the neighboring third or fourth carbon atom is assumed to be a model
structure, the fluorine-containing ethylenic monomer having OH group
satisfies Equation 1:

10 $\Delta H = H(M-O^-) + 200 - H(M-OH) \leq 75$ (Equation 1)

wherein $H(M-OH)$ is a produced enthalpy of the model structure, $H(M-$

$O^-)$ is a produced enthalpy of the fluorine-containing ethylenic monomer

after dissociation of the OH group and a produced enthalpy of hydrogen

15 ion is assumed to be a constant of 200 kJ/mol.

16. The photoresist composition of Claim 15, wherein the
fluorine-containing ethylenic monomer having OH group satisfies
Equation 2:

20

$$\Delta H = H(M-O^-) + 200 - H(M-OH) \leq 70 \quad (\text{Equation 2}).$$

17. A photoresist composition which is a composition
comprising:

25 (A) a fluorine-containing polymer having, as an essential component, a
structural unit obtained by polymerizing a fluorine-containing ethylenic
monomer having OH group,

(B) a photoacid generator, and

(C) a solvent,

in which the fluorine-containing ethylenic monomer having OH group has a structure represented by the formula (50):

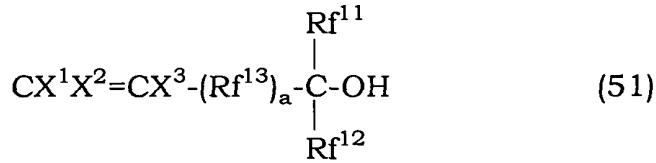
5



10 wherein Rf^{11} and Rf^{12} are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Z is fluorine atom or a perfluoroalkyl group having 1 to 20 carbon atoms.

15 18. The photoresist composition of Claim 15, in which the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (51):

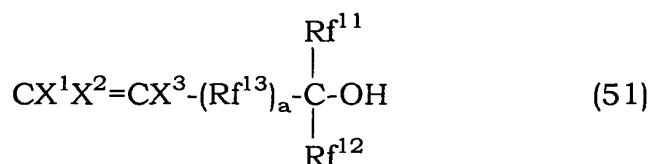
20



wherein X^1 and X^2 are the same or different and each is H or F; X^3 is H, F, Cl or CF_3 ; Rf^{11} and Rf^{12} are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^{13} is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is

0 or 1.

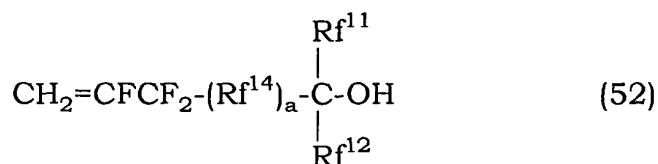
19. The photoresist composition of Claim 17, in which the fluorine-containing ethylenic monomer having OH group is a fluorine-
5 containing ethylenic monomer represented by the formula (51):



10

wherein X^1 and X^2 are the same or different and each is H or F; X^3 is H, F, Cl or CF_3 ; Rf^{11} and Rf^{12} are the same or different and each is a perfluoroalkyl group having 1 to 20 carbon atoms; Rf^{13} is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more; a is
15 0 or 1.

20. The photoresist composition of Claim 15, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-
20 containing ethylenic monomer represented by the formula (52):



25

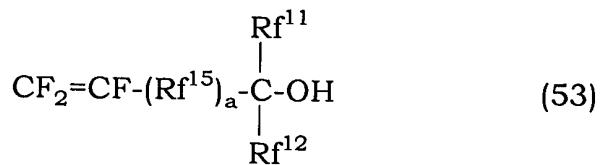
wherein Rf^{11} , Rf^{12} and a are as defined in the formula (51); Rf^{14} is a

fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

5

21. The photoresist composition of Claim 15, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (53):

10

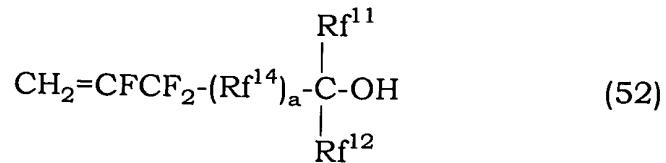


15 wherein Rf^{11} , Rf^{12} and a are as defined in the formula (51); Rf^{15} is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

20

22. The photoresist composition of Claim 17, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (52):

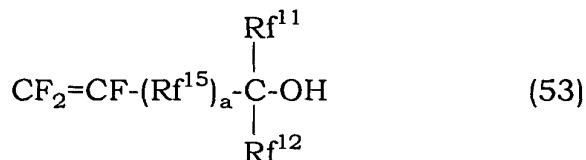
25



wherein Rf¹¹, Rf¹² and a are as defined in the formula (51); Rf¹⁴ is a fluorine-containing alkylene group having 1 to 39 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 99 carbon atoms and the sum of carbon atom and oxygen atom of two or
5 more.

23. The photoresist composition of Claim 17, wherein the fluorine-containing ethylenic monomer having OH group is a fluorine-containing ethylenic monomer represented by the formula (53):

10



15 wherein Rf¹¹, Rf¹² and a are as defined in the formula (51); Rf¹⁵ is a fluorine-containing alkylene group having 1 to 40 carbon atoms or a fluorine-containing alkylene group having ether bond which has 1 to 100 carbon atoms and the sum of carbon atom and oxygen atom of two or more.

20

24. A photoresist composition which is a composition comprising:

(A) a fluorine-containing polymer having, as an essential component, a structural unit derived from a fluorine-containing ethylenic monomer
25 having functional group comprising OH group and a protective group which protects the OH group and can change the functional group to the OH group through a reaction by an acid,

(B) a photoacid generator, and

(C) a solvent,

wherein the fluorine-containing polymer (A) is a fluorine-containing

polymer obtained by polymerizing the fluorine-containing ethylenic

5 monomer having OH group of Claim 15, in which the monomer has
functional group comprising said protective group protecting the OH
group.

25. A photoresist composition which is a composition

10 comprising:

(A) a fluorine-containing polymer having, as an essential component, a
structural unit derived from a fluorine-containing ethylenic monomer
having functional group comprising OH group and a protective group
which protects the OH group and can change the functional group to the

15 OH group through a reaction by an acid,

(B) a photoacid generator, and

(C) a solvent,

wherein the fluorine-containing polymer (A) is a fluorine-containing

polymer obtained by polymerizing the fluorine-containing ethylenic

20 monomer having OH group of Claim 17, in which the monomer has
functional group comprising said protective group protecting the OH
group.